

# VERIFICATION OF METAL TAPES

## Department of Commerce and Labor

### BUREAU OF STANDARDS

#### Washington

BUREAU CIRCULAR NO. 2  
2D EDITION\*

January 10, 1907.

Under the provisions of an act of Congress approved March 3, 1901, establishing the Bureau of Standards, this Bureau is authorized, among other things, to compare the steel and other metal tapes used in engineering, surveying, and manufacturing, with the United States Bench Standard. The Bureau is prepared to receive such tapes for comparison, subject to the following regulations:

#### NATURE OF THE TEST.

The total length and as many divisions as may be desired will be tested, the fee depending upon the number of divisions compared.

In many cases it is sufficient to know the correction for the full length of the tape only. For measuring distances greater or less than the full length of the tape, it is unnecessary to test more than a few additional subdivisions. For example, any distance in even feet greater or less than the full length of a 100-foot tape may be accurately measured if the corrections are known for its entire length, for each 10-foot subdivision, and for each foot of the first 10 feet.

#### REGULATIONS.

1. **CONDITIONS OF TEST.**—In every case the party desiring verification of a tape must specify the exact number of comparisons desired, the points at which such comparisons are to be made, and also the tension to be used. For general purposes the test indicated above is to be recommended.

2. **IDENTIFICATION MARKS.**—Tapes and the packages in which they are shipped should both be plainly marked to facilitate identification, preferably with the name of the manufacturer or shipper, and a *special reference number given to each tape*. This reference number should be referred to in correspondence concerning the tape.

3. **CERTIFICATION NUMBER.**—The Bureau of Standards test number will be stamped or etched upon the tape if the total length is on a single piece of metal ribbon. A tape on which the initial mark is a wire loop, or where the end mark is on a spring balance sent with the tape, will not be stamped with the certificate number.

4. **ADDRESS.**—Articles should be addressed simply "Bureau of Standards, Department of Commerce and Labor, Washington, D. C.," and not to members of the Bureau staff. Delays incident to other forms of address will thus be avoided.

Articles delivered in person or by messenger should be left at the office of the Bureau with a written request for the verification.

5. **SHIPPING DIRECTIONS.**—Tapes should be securely packed in cases or packages which may be used in returning them to the owner. In all cases transportation charges are payable by the party desiring the test, and *should be prepaid*.

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\* Superseding the first edition, issued December 1, 1903.

6. RETURN OF TAPES.—Tapes will be returned by express, charges “collect,” unless otherwise arranged for. Articles are not returned until all charges due the Bureau have been paid.

7. REMITTANCES.—Fees should be sent with the tape in accordance with the schedule of fees shown on the following page, and should be remitted by United States postal money order or by express money order drawn to the order of the “Bureau of Standards.” Payment by check is not desired. Delays in forwarding fees involve corresponding delays in the return of the tape.

8. SCHEDULE OF FEES.—The following schedule of fees for verification of tapes has been established:

#### SCHEDULE 3.—STEEL TAPES, SUPPORTED THROUGHOUT ENTIRE LENGTH.\*

##### I.—TAPES GRADUATED INTO FEET.

|   |        |
|---|--------|
| (a) For <i>total length</i> not greater than 100 feet .....   | \$0.75 |
| (b) For <i>total length</i> of 200 feet, including comparison of the 100-foot division .....                        | 1.25   |
| (c) For <i>total length</i> of 300 feet, including comparison of 100-foot and 200-foot divisions .....              | 1.75   |
| (d) For <i>total length</i> of 400 feet, including comparison of the 100-foot, 200-foot, and 300-foot divisions.... | 2.25   |
| *(i) For comparing tapes supported at intervals the above charges will be doubled.                                  |        |

##### II.—TAPES GRADUATED INTO METERS.

|  |      |
|--|------|
| (e) For <i>total length</i> of tapes not longer than 30 <i>meters</i> .....  | .75  |
| (f) For <i>total lengths</i> over 30 meters and not greater than 60 meters, including comparison of middle point .....               | 1.25 |
| (g) For <i>total lengths</i> over 60 meters and not greater than 90 meters, including comparison of each third of total length ..... | 1.75 |
| (h) For <i>total length</i> of 100 meters, each 25-meter point also compared .....   | 2.25 |
| *(i) For comparing tapes supported at intervals the above charges will be doubled.   |      |

##### III.—GENERAL CHARGES.

|   |     |
|---|-----|
| (j) For each further subdivision compared .....   | .10 |
| Determination of the length at an additional tension:   |     |
| (k) For tapes included above under (a) and (e) .....  | .10 |
| (l) For tapes included above under (b) and (f) .....  | .20 |
| (m) For tapes included above under (c) and (g) .....  | .30 |
| (n) For tapes included above under (d) and (h) .....  | .40 |
| (o) For comparison of total length at two different temperatures, the above charges will be doubled for items under I and II, and for more than two temperatures the charge will be in proportion. These comparisons are to furnish data for the determination of the <i>coefficient of expansion</i> . It should be noted, however, that comparisons of a large number of tapes of various makes, covering a wide range of temperature, indicate that coefficients of expansion of steel tapes do not differ materially from that of the United States Bench Standard, viz, 0.0000063 per degree Fahrenheit or 0.0000114 per degree centigrade, and for all purposes except the most refined geodetic work the above coefficient is sufficiently accurate. When a special determination of the coefficient is desired time must be allowed to secure the necessary range of temperature. |     |

##### Determination of modulus of elasticity:

|  |      |
|--|------|
| (p) For special determination of the modulus of elasticity for tapes included under (a) and (e) above ..     | .75  |
| (q) For determination of modulus of elasticity for tapes included under (b) and (f) above .....              | .90  |
| (r) For determination of modulus of elasticity for tapes included under (c), (d), (g), and (h) above....     | 1.10 |
| (s) For testing spring balances accompanying steel tapes .....   | .10  |
| (t) For graduating tapes, each line .....  | .50  |
| (u) Discount from above fees of 20 per cent will be allowed when tapes are submitted in lots of ten or more. |      |

Items not covered in the above schedule will be charged at moderate rates.

9. CERTIFICATION.—The certificate furnished by the Bureau of Standards will contain the following data:

- (a) Description of tape.
- (b) Bureau of Standards number, where allowed (see Regulation 3 above).
- (c) Name of party for whom tape is compared.
- (d) The name of the maker.
- (e) Temperature at which the comparison is made.
- (f) Method of support of tape.
- (g) Tension at which the tape is compared and at which it should be used.
- (h) Corrected value of each space compared, at the standard temperature, which is 62° Fahrenheit for customary tapes and 0° centigrade for metric tapes.
- (i) Date of certification.
- (j) The signature of the Director.
- (k) The seal of the Bureau.
- (l) Special remarks, when necessary.

Approved:

OSCAR S. STRAUS,  
*Secretary.*

S. W. STRATTON,  
*Director.*

